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Case Report

Polymicrobial infective endocarditis caused by *Neisseria sicca* and *Haemophilus parainfluenzae*

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ABSTRACT

Infective endocarditis is a common clinical problem in industrialized countries. Risk factors include abnormal cardiac valves, a history of endocarditis, intracardiac devices, prosthetic valves and intravenous drug use. We report a case of polymicrobial infective endocarditis in a 33 year-old female with a history chronic heroin use caused by *Neisseria sicca* and *Haemophilus parainfluenzae*. We believe the patient was exposed to these microbes by cleansing her skin with saliva prior to injection. Pairing a detailed history with the consideration of atypical agents is crucial in the proper diagnosis and management of endocarditis in patients with high-risk injection behaviors.

Introduction

Infective endocarditis (IE) is a common clinical problem occurring in 3–9 cases per 100,000 in industrialized countries. The most common risk factors for this disease include abnormal cardiac valves, a previous history of endocarditis, intracardiac device or prosthetic valve placement, unrepaired cyanotic heart disease and intravenous drug use (IVDU) [1]. Acute cerebrovascular events, septic or bland emboli to organs such as the liver, brain, kidney, bone marrow, and valvular damage with subsequent heart dysfunction are common complications of the disease.

The most common etiologic agents of IE are: *Staphylococcus aureus*, alpha-hemolytic *streptococci*, *Enterococcus* species, coagulase negative *Staphylococcus*, *Pseudomonas*, the HACEK group (*Haemophilus* species, *Actinobacillus* (now called *Aggregatibacter*) *actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens* and *Kingella* species) and fungi. Conditions such as damage to the skin barrier, disruption of the gingiva during tooth extractions, poor oral hygiene, intestinal disorders like colon cancer and inflammatory bowel disease, tattooing and intravenous drug use allow these organisms to gain access to the blood and colonize the valves of the heart. In the setting of IVDU, IE most commonly presents as a monoinfection of *S. aureus*, *Streptococcus pneumonia*, or *Pseudomonas aeruginosa*. Less commonly, IE may present as a polymicrobial infection especially in IVDU cohort consisting of combinations of *Candida* spp. and bacteria [2]. We present a case where a patient developed polymicrobial IE due to an unusual practice executed prior to her injection of heroin.

Case presentation

A 33 year old Caucasian female with past medical history of methicillin resistant *S. aureus* endocarditis in 2011 with chronic IV heroin use presented to the emergency department with complaints of recurrent fever and weakness for over a month. She was hospitalized at an outside hospital (OSH) 3 days prior to her admission where she was diagnosed with sepsis and found to have blood cultures positive for gram-negative diplococci. She was briefly treated with intravenous antimicrobials before she left the hospital against medical advice. Persistent generalized myalgias, fatigue and fever brought patient back to the emergency department again for further work up and treatment.

Upon admission, her blood pressure was 93/55 mm Hg, her respiratory rate was 20 breaths/min, her heart rate was 110 beats/min with a temperature was 37 °C and her oxygen saturation was 95% on room air. The physical examination revealed a holosystolic murmur at the left sternal border without radiation and a small erythematous non-tender lesion on the ventral aspect of her right ring finger. After drawing blood cultures, she was started on empiric antimicrobial therapy with vancomycin and piperacillin-tazobactam. By day 3 of her hospitalization, the aerobic bottle grew

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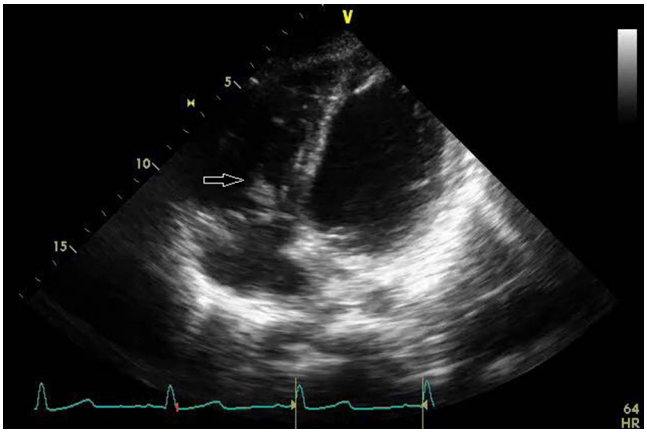

Fig. 1. Mobile mass on tricuspid valve; right ventricular inflow view.

gram-negative diplococci later identified as *Neisseria sicca*, the same organism isolated in her blood cultures from her most recent hospitalization at OSH. The patient's therapy was switched to ampicillin and gentamicin.

Two-dimensional transthoracic echocardiography revealed a 1.7×0.7 cm vegetation on the tip of anterior leaflet of the tricuspid valve and moderate tricuspid regurgitation (Fig. 1; video 1). The patient was evaluated by cardiothoracic surgery, who did not recommend any surgical interventions at that time. On day 5 of her hospital stay, one of the aerobic bottles from the initial set of blood culture grew *Haemophilus parainfluenzae.* Based on recommendations of the Infectious Disease service, we switched her antimicrobial therapy to ceftriaxone. In light of her blood cultures growing 2 different organisms that belong to the normal flora of the oral cavity, we spoke to the patient again about her practices prior to injection. Interestingly, while the patient used bottled water in the preparation of the heroin solution and denied sharing needles with others, she did admit to routinely biting and sucking on the skin prior to injection as a means of "sterilizing" the involved area. The remainder of patient's hospital stay was uncomplicated, and she was later discharged to complete a four-week antimicrobial course as an outpatient.

Discussion

While cases of polymicrobial endocarditis are considered rare, they are associated with a high mortality rate of roughly 30% [3]. Polymicrobial IE is increasing in incidence, especially amongst intravenous drug users and over 50% of these patients require cardiac surgical intervention for control of infection or for repairing damaged heart valves [2,4]. IVDU is also a well known risk factor for recurrent IE [5]. Both *N. sicca* and *H. parainfluenzae* are rare causes of endocarditis and there have been few cases of polymicrobial endocarditis in the literature to date where these organisms have been implicated as the causative agents [6]. Rather, the combinations of *S. aureus* with *S. pnuemonia* and *S. aureus* with *P. aeruginosa* represent far more common polymicrobial infections which lead to IE in IVDU patients [2]. These bacteria have a predilection for the right side of the heart, affecting the tricuspid valve in up to 75% of IVDU with IE as compared to 9% in cases of IE in non-IVDU patients. Meanwhile, mitral valve involvement in IVDU patients is far less common, representing only 30% of cases [7].

Haemophilus species rarely cause IE and majority of cases occur due to *H. parainfluenzae* [8]. The microorganism is a member of the HACEK group and part of normal oral flora in humans. *H. parainfluenzae* is a slowly growing organism requiring special media. The study consisting of 42 cases from *Haemophilus* endocarditis showed mean incubation time of 5 days (1–20 days) [8], highlighting the importance of holding blood cultures for prolonged time when IE is suspected.

N. sicca, a Gran-negative diplococcus is considered as a commensal bacteria and is mainly found in the respiratory tract [9]. The microorganism is a rare cause IE and to our knowledge there are less than 30 case reports in the literature. Authors report IVDU being a risk factor for *N. sicca* endocarditis along with the presence of prosthetic valve and immunosuppression [9–11]. Compared to *Haemophilus* species, incubation time is relatively short and microorganism grows easily on blood cultures.

Intravenous drug users using heroin are more prone to developing tricuspid valve endocarditis due to drug induced pulmonary hypertension and increased right sided turbulence [12]. Patients with automatic implantable cardioverter-defibrillator (AICD), permanent pacemaker, central venous catheter or congenital heart disease are also prone to right sided IE, but the risk is higher in IVDUs. Systemic complications such as acute cerebrovascular events or systemic septic emboli are rare complications of right sided IE due to the sieve-like effect of the pulmonary vasculature. Accordingly, these patients usually present with recurrent fever, cough, hemoptysis or other pulmonary symptoms due to septic emboli to the lungs.

Previous case reports have documented various practices employed by IVDUs that increase the risk of infection from bacteria of the oral cavity. These habits include blowing into or licking needles prior to injection and using saliva or non-sterile tap water as a diluting agent for the final heroin solution. These high-risk behaviors allow flora of the oral cavity, such *H. parainfluenzae*, to bypass the host's natural defenses and gain access to the blood stream. In this case report, we document another practice among IVDUs that may predispose these individuals to polymicrobial infections from flora of the oral cavity: the use of one's own saliva to "sterilize" skin prior to injection.

Our patient was managed successfully with medical therapy without further sequelae. Right sided endocarditis usually has a more benign prognosis than left sided endocarditis, with the in-hospital mortality being less than 10% [13]. Studies have shown that the main predictors of mortality in IVDUs with right sided endocarditis are a fungal etiology and vegetation size >20 mm [14,15]. Early diagnosis and treatment with either antimicrobial or sometimes surgical therapy remain critical for favorable outcome. Empiric coverage of skin and oral flora can be considered in IVDU patients with habits, such as licking needles or skin prior to injection or the use of saliva as a solvent for the drug.

In summary we report a case of polymicrobial IE caused by *N. sicca* and *H. parainfluenzae* in a patient with a history of IVDU. This case clearly demonstrates how injection practices, such as the use of saliva for sterilizing injection sites, create opportunities for flora of the oral cavity to gain access to the blood stream and precipitate right-sided endocarditis. We reiterate the importance of holding blood cultures for a prolonged time and a detailed history in the evaluation of patients with suspected IE, advise the consideration of polymicrobial infection, especially in patients with a history of IVDU. To elicit such a history, we stress the importance of a non-judgmental approach so the patient feels comfortable sharing the details of their drug usage such as needle and drug acquisition, disposal, and their injection practices.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.idcr.2015.11.002.

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